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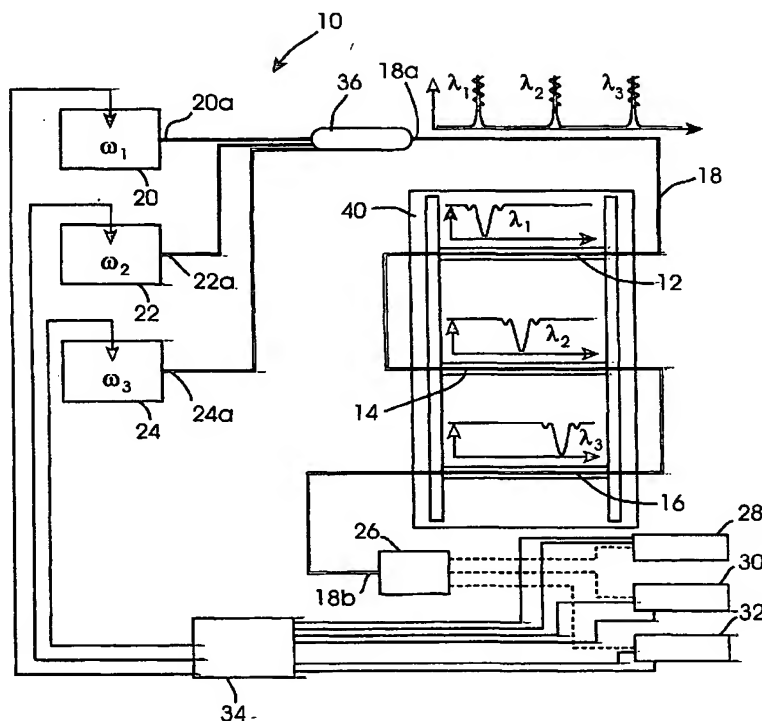
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(54) Title: OPTICAL WAVEGUIDE BASED SURFACE PROFILING APPARATUS



(57) Abstract: Surface profiling apparatus (10) according to one embodiment comprises three long period gratings (LPGs) (12, 14, 16) fabricated in progressive three layered (PTL) fibre (18) and embedded within a deformable carrier member (40) comprising a skeleton (42) provided between two sheets of flexible rubber skin (44, 46). The LPGs (12, 14, 16) are illuminated by three wavelength modulated, narrow bandwidth optical signals, each having a different wavelength and modulation frequency. A photodetector (26) connected to three lock-in amplifiers (28, 30, 32) measures the amplitudes of the first and second harmonic frequency components of the photodetector output signal corresponding to each LPG (12, 14, 16). Similar surface profiling apparatus (10) forms the basis for respiratory function monitoring apparatus (100) in which five LPGs are provided within each of four PTL fibres (104, 106, 108, 110) and embedded in four carrier members (40a-d) attached to a garment (114) to be worn by a subject.